

Edge2Hats Transformation with cGANs

Conditional Generative Adversarial Network

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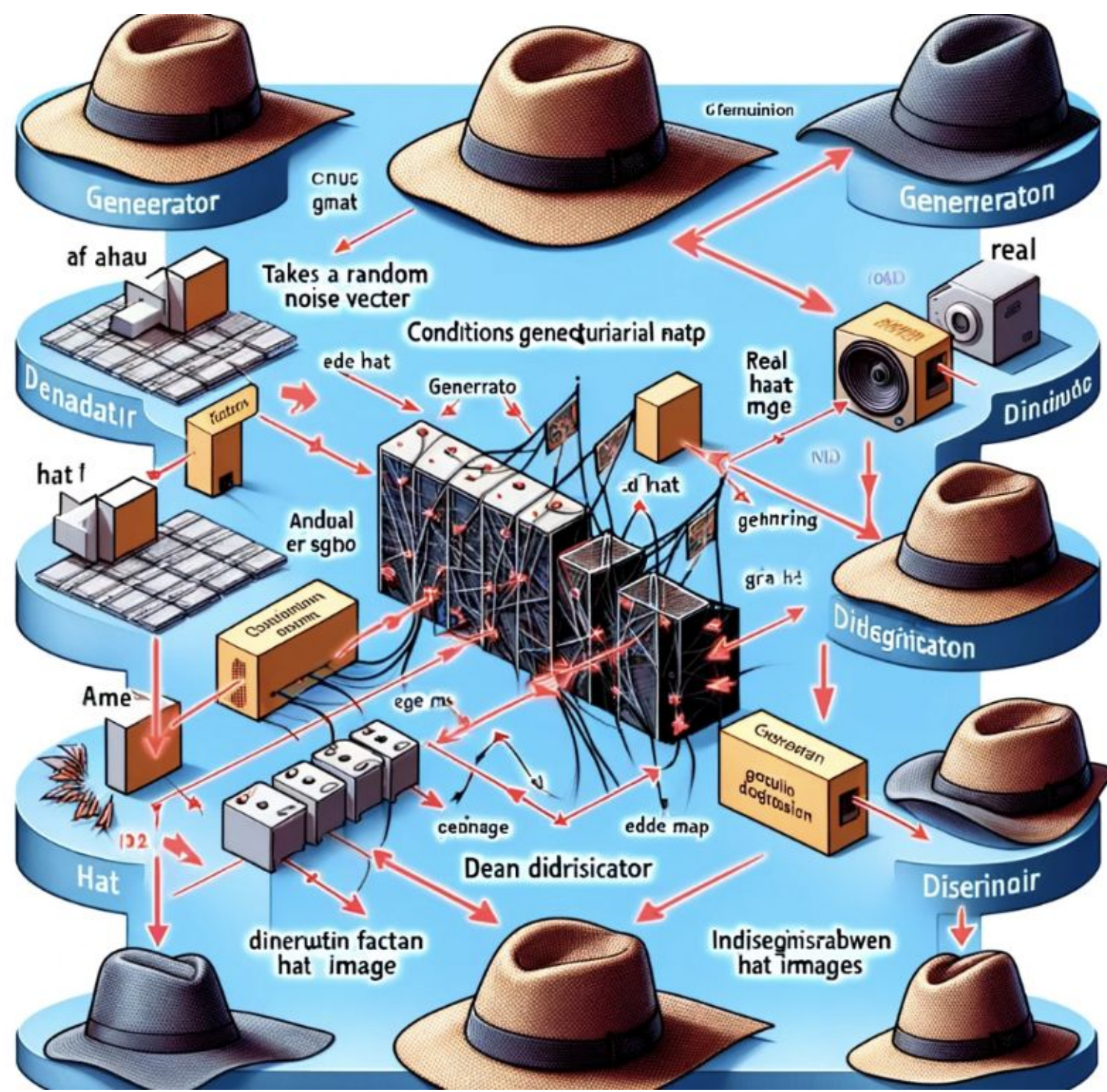
Introduction

Edge2Hat employs Conditional Generative Adversarial Networks (cGAN) to transform simple line drawings into color-filled hat images. Utilizing a web crawler on Amazon and undergoing rigorous preprocessing and augmentation, our model has amassed a dataset of over 40k images to enhance the training process of the cGAN models. Edge2Hat enhances the fashion design process by enabling rapid customization and bridging the gap from concept to final visualization. With this innovative tool, employing artificial intelligence, say farewell to design limitations and welcome limitless creativity with Edge2Hats!

Methods

Our project utilizes a cGAN framework, comprising two neural networks:

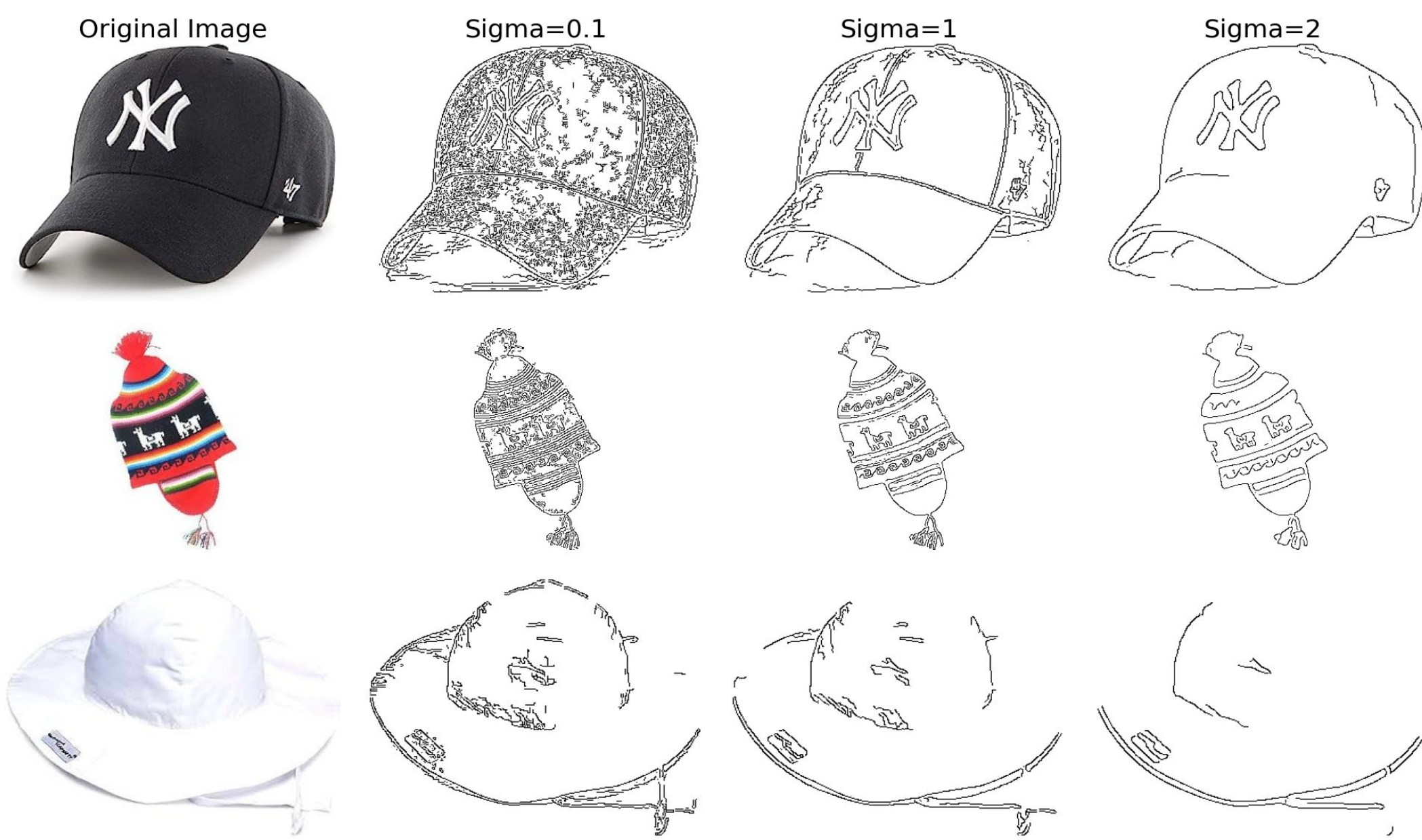
- Generator (G):** Converts line drawings into detailed, colored images.
- Discriminator (D):** Distinguishes between generated images and real images, improving the realism of the generated outputs.



The networks engage in a competitive optimization process, which refines their abilities through extensive training phases.

Data Analysis

- Data Collection:** We collected diverse hat styles from Amazon, focusing on images with clear edges and uniform backgrounds.
- Preprocessing:** Images were cleaned and augmented to enhance the dataset's robustness, including rotations, color adjustments, and mirroring.
- Data Augmentation:** Randomly adjust hats images through flipping, rotation, position adjustments, etc. to enlarge the dataset and avoid overfitting.
- Edge Detection:** Utilized Canny Edge Detection to extract crucial features from images, preparing them for the training process.



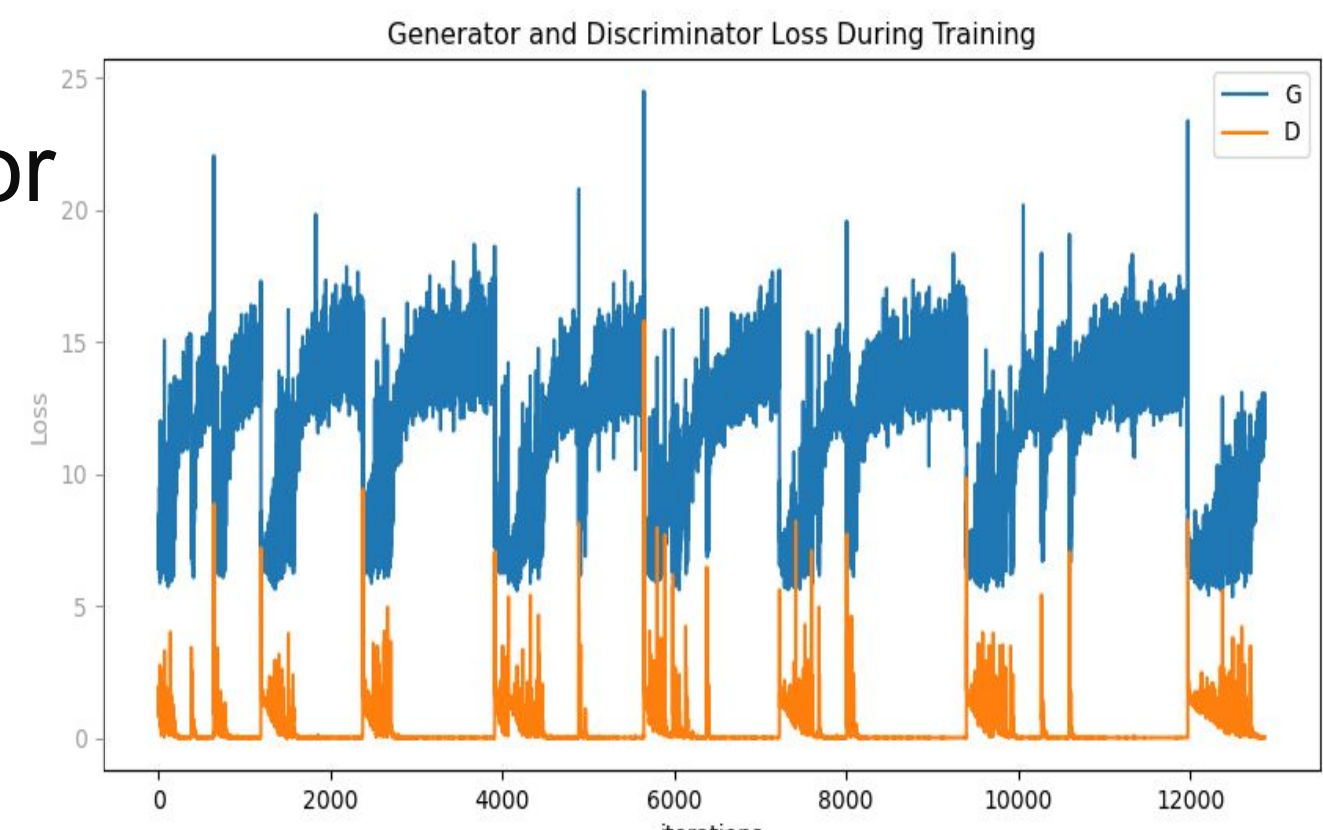
- Dataset Split:** Split the data into training set and test set with 9:1 train test split ratio.
- Model Training:** Utilized NVIDIA A6000 GPU to run 4 different cGANs models with different regularization factors. Selected the optimal model through models' performance on the test set.

Sample Generated Images



Results

- Model Improvements:** Enhanced realism in generated images, with significant advancements in texture and color fidelity.
- Metrics:** Shrinking loss difference between Generator and Discriminator through training indicated convergence to global minimum states. Manual judgement was also conducted and conclude closer similarity to real images.



Visual Comparisons:

- Edge to Image:** Effective transformation from simple edges to detailed images.
- Real vs. Generated:** Demonstrated high accuracy with potential areas for refinement highlighted.



- User Feedback:** Positive response to the interactive website for its ease of use and real-time capabilities.

It is wonderful

A life-changing, inspiring intersection of art and technology

Highly engaging for users and demonstrating a significant leap in creative design technology



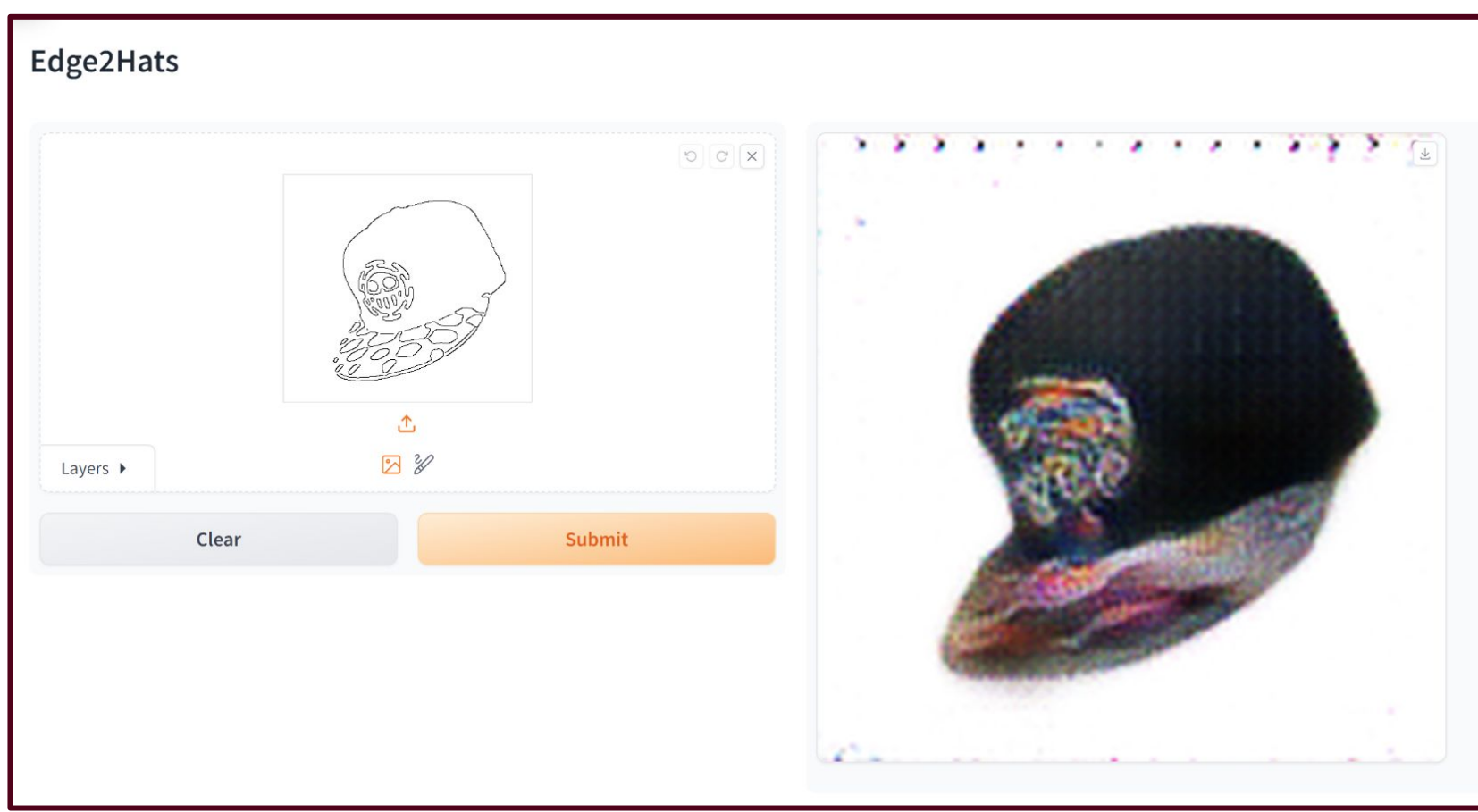
- Limitations:** Copyright risks; Inability to encompass all designs of hats; Suboptimal technical performance metrics; Incompatibility of Python scripts for 2C products

Conclusion

Technological Innovation: Edge2Hat showcases advanced capabilities of cGANs, transforming simple line drawings into realistic images, and setting new benchmarks in image-to-image translation.

Enhanced Design Process: The technology streamlines the design cycle, significantly reducing time from concept to prototype, fostering innovation and efficiency in various industries.

Consumer Interaction: It elevates consumer experiences by allowing real-time customization and personalization, making the design process accessible



Interactive Website Page

Future Potential: Encourages further application extensions into other products and industries, highlighting the scalable nature of this technology.

Model Deployment QR Codes

Windows



MacOS



Additional Interactive Tools:

Adjustable parameters include color balance, pen thickness, and other functions include upload, undo, redo, download, etc.

References

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